

**CHUM STOCK ID ASSESSMENT (CANADIAN AREA 3
COMMERCIAL FISHERY OTOLITHS): ADF&G
COMPONENT**

by

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EXECUTIVE SUMMARY

The Alaska Department of Fish and Game Thermal Mark Laboratory, Juneau examined chum salmon (*Oncorhynchus keta*) otoliths for the presence of thermal marks as part of a multi-year stock identification assessment of Canadian chum salmon. Chum salmon otoliths recovered from 2019 fisheries were analyzed during fall/winter 2019-2020 to determine the presence of a thermal mark. From the 2019 fishery sampling, we received 790 samples of which 779 were readable. Of these, 428 (54.9%) were thermal marked, 89.3% of the marked fish were released in Nakat Inlet, Alaska. The Southern Southeast Regional Aquaculture Association's Whitman Lake Hatchery utilizes Nakat Inlet as a remote release site.

Key words: chum salmon, *Oncorhynchus keta*, thermal mark, hatchery, otolith

INTRODUCTION

Thermal marking of salmonid otoliths is an effective tool for identifying hatchery salmon (Munk and Smoker 1991; Volk et al. 1990), because thermal mark identification is quick and fairly accurate (Hagen et al. 1995). Salmonid otoliths are thermal marked by exposing them to repeated temperature cycles that create patterns of optically-dense bands (Volk et al. 1990). Thermal mark identification is used by the Alaska Department of Fish and Game (ADF&G) for in-season management of Alaska's salmon stocks (TTC 1990) and for evaluation of hatchery success rates. Recent studies have used thermal marks to document the presence and distribution of stray hatchery chum salmon (*Oncorhynchus keta*) in index streams throughout Southeast Alaska (Piston and Heintz 2011).

The objective of this study was to detect and identify chum salmon thermal marks to assist with tracing the impacts of Canadian commercial fisheries on northern British Columbia chum salmon stock. This was part of the Chum Stock Identification Assessment project in Canadian Area 3 commercial seine and gillnet fisheries coordinated by Katie Beach, Fisheries and Oceans Canada (DFO).

METHODS

Chum salmon otoliths were collected from the Canadian Area 3 commercial fishery in 2019, as part of a continuing study to identify the component of hatchery stocks in the catch. Otoliths from fish sampled were sent to ADFG's Mark, Tag, and Age Laboratory in Juneau, Alaska for analysis. All sample data were entered in specialized applications, and summary results were immediately available online. Individual specimen results were queried from the Southeast Alaska Mark Recovery Oracle database, and results were sent to DFO.

The chum salmon otoliths were prepared for thermal mark examination in the Mark Lab. Otoliths were cleaned with a chlorine solution (5%), rinsed with a de-chlorine solution (0.7% thiosulfate), and then mounted on 1- by 2-inch glass slides with thermoplastic cement. Otoliths were examined for thermal mark presence by grinding the otolith on a grinder using 800 grit grinding paper until the primordia were visible under 200x magnification on a compound microscope. Fine polishing was performed by hand using 9 µm grinding paper. Readers identified specimens as marked, unmarked, or unreadable. If a specimen was marked, readers described the mark with special codes known as hatch codes and each mark was given its

designated mark identification. For quality control, each specimen was independently read a second time, and any conflicts between the two reads were resolved.

RESULTS AND DISCUSSION

From the 2019 fishery, ADF&G Mark, Tag, and Age Lab readers examined 790 samples of which 779 were readable (Table 1). Of these, 428 (54.9%) were thermal-marked, and 420 (98.1%) were marked by the Southern Southeast Regional Aquaculture Association (SSRAA) and released in southern southeast Alaska. Five otoliths were found with marks indicating that they came from northern southeast Alaska (three sites, Table 1). Of the SSRAA marks, most (382, 49.0%) recoveries were released in Nakat Inlet. Most (332, 86.9%) of the Nakat Inlet recoveries were from the brood year 2015 summer release. Nakat Inlet is a remote release site used by Whitman Lake Hatchery, part of SSRAA.

The 2019 chum salmon results by specimen were delivered to the Department of Fisheries and Oceans Canada Stock Assessment Biologist on 6 February 2020.

We met all required timelines and objectives. We were unable to judge the benefits of this project. We provided the data to the Prince Rupert Department of Fisheries and Oceans office, and they utilized it in their fishery management.

A summary of the financial expenditures will be sent separately by ADF&G Headquarters. There was little deviation from the projected budget.

Table 1. Thermal marks (n = 428) recovered from 790 otoliths collected during the 2019 fishing season in British Columbia's Area 3. SSRAA = Southern Southeast Regional Aquaculture Association; DIPAC = Douglas Island Pink and Chum, Inc.; NSRAA = Northern Southeast Regional Aquaculture Association; AKI = Armstrong-Keta Inc.

Area	Agency	Mark Name	n	Total Release Site	Overall %
Northern SE AK	NSRAA	BEARCOVE15A	1	1	0.2%
	DIPAC	DIPAC14	1	3	0.7%
		DIPAC15B	2		
	AKI	PORTARMSTRONG15CHUMA	1	1	0.2%
Southern SE AK	SSRAA	ANITABAY13	1	11	2.6%
		ANITABAY15	9		
		ANITABAYLL15	1		
		KENDRICK13	1	23	5.4%
		KENDRICK15	22		
		NAKATINLET14Sum	21	382	89.3%
		NAKATINLET15Fall	4		
		NAKATINLET15Sum	332		
		NAKATINLET16Sum	25		
		NEETSBAY14Sum	1	4	0.9%
		NEETSBAY15Sum	1		
NEETSBAY16Sum	2				
British Columbia	DFO	KITH2014CHUMH14	1	3	0.7%
		KITH2015CHUMH14	1		
		NITH2015CHUM31H	1		

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